

Human Geography: First Principles and some Applications.¹

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IT is a curious fact that, although geographers are agreed that man's intelligence and power of acquiring and transmitting knowledge so differentiate him from animals that it is necessary to distinguish between human geography and animal geography, yet, so far as I am aware, little detailed consideration has been given to the question as to the respects in which his response to environmental conditions differs from that of the animals. This is unfortunate, more especially since, thanks to the biologists, we have a fairly clear idea as to the mechanism of the response in the latter case.

If, for example, we take two familiar animals, such as the rabbit and the common hare, we find that, though belonging to the same genus, and generally resembling each other in structure, they show certain minor differences in bodily form and habits fitting them for their respective environments. The biologists are broadly agreed that these differences are an adaptive response to the different environments of the two animals. In explaining the origin of that adaptive response, most of them lay stress on the two factors of fixation to a particular environment and isolation—actual or physiological—within it, so that incipient variations are not swamped by intercrossing. Now when we turn to man, two facts are at once apparent. First, at the present time, he does not appear to respond to environmental influences by adaptive modifications of bodily form. Secondly, there was certainly a time, before he had come fully to his heritage, when he did so respond. We know this because the anthropologists are agreed that while man once ran into a number of species—and of genera—now all living human beings belong to the same species, and even the races show marked signs of being in process of becoming swamped by intercrossing. In other words, there was a time when there was no human geography, when man reacted to the sum total of the conditions as an animal does; but that time appears largely to have passed.

But there is certainly still a human response to environmental conditions. What precise form does it take? To a certain minor extent, apparently as an inheritance from what I regard as essentially the pre-human period, there is a direct structural response. But man's real response to the surface phenomena of the earth takes the form of a communal, not an individual response. It is the aptitudes which the members of a community display, the tools which they use, the kind of knowledge which they accumulate, their modes of organisation, their type of material wealth, their traditions and ideals, which show the environmental imprint most closely—far more closely than the colour of their skins or the shape of their heads.

But when and how did the change in the two modes of response come about? To answer this question let us recall what has been already said as to the importance of fixation and isolation in the case of animals. The surface of the earth is almost infinitely diverse, and what the biologists call natural barriers, the major

barriers like deserts, seas, and mountain chains, or the minor ones produced by the transition from one type of plant formation to another—*e.g.* from the forested river valley to the grass-covered upland—separate different types of environment, and form obstacles to the distribution of most land animals. There must have been a time when groups of men, no less than the pigs in the forest or the asses on the steppe, were firmly gripped by the physical conditions, were isolated from other groups, and forced to become fitted by structure and habit for a particular set of conditions, or to die out. But with his growing intelligence man escaped from this iron grip, learnt to make virtually every part of the surface yield enough for survival, and proved capable of overcoming every kind of natural barrier. When this occurred the old mechanism of adaptation largely—though not completely—ceased to work. Evolution then might have ceased also, man might have become specially fitted to no environment because fitted for all, if the factors of fixation and isolation had not, in quite a different fashion, obtained a new hold.

Man ceased, save in relatively few parts of the earth's surface, to be a continuous wanderer. He settled down afresh on particular parts of it, and there learnt to use his increasingly complex brain not only in utilising to their full the natural resources, but also in modifying the local conditions so that new resources became available. In other words, I wish to suggest that the cultivation of the soil was the great agent in ensuring the new type of fixation to a particular area which once again made evolution possible. But evolution now took the form of increasing development of communal life, or, in other words, the growth of what we call civilisation is the precise equivalent of specific differences in plant or animal.

Further, just as, in the case of the animal, isolation is necessary before an incipient species can become fixed, so in the case of human communities a measure of protection from the inhabitants of neighbouring areas—a measure, that is, of isolation—is essential before civilisation can develop.

Again, in the case alike of plants and animals we know that where the local conditions are such that the incipient species is limited to a very narrow area, highly specialised forms of adaptation may occur, as they do, for example, on many islands, or in isolated mountain chains; but that specialised type of development is associated with the loss of the capacity to vary, to acquire adaptations fitting the organism for a wider area. So in the case of human communities, where the isolation is too complete the power of adaptation tends to be lost, and such groups, though their civilisation may, along its own lines, be of a highly specialised type, are easily overwhelmed when contact with the outside world does occur, just as island animals tend to disappear before introduced forms.

With these general statements as starting-point, let us consider some facts in regard to the development of civilisation in Europe and the margins of the adjacent continents.

In this area history has seen three successive great

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toeci of civilisation, each based on well-marked and distinctive geographical conditions. The development of the three types has been successive and not simultaneous, and there has thus been a steady shift in time of the main focus, a shift westward and north-westward. The three types of human societies alluded to are, of course (a) the river valley type as represented in Babylonia and early Egypt; (b) the Mediterranean type on parts of the seaboard of the Midland sea; (c) the forest type of Europe proper, itself becoming progressively more and more influenced by the greater ocean to the west, so that forest influences have steadily given way to maritime ones.

It is not necessary to consider the geography of these areas in detail. But, beginning with Babylonia and Egypt, I should like to put the causes which seem to me to have promoted fixation quite briefly. Among them we must certainly include the primitive natural resources, scanty though these doubtless were. The birds of the valley marshes, the relatively small number of mammals, the fish of the rivers, must have supplied a certain amount of the animal food. The date palm, in the Tigris-Euphrates areas at least, would, even in its wild state, doubtless yield a fruit of some value in the very early days.

But as an important factor in the development of cultivation, I would lay especial stress upon the presence of what the botanists call the "open" plant formation. Native trees, as we know, are very few, the date palm, one of the most characteristic, being strictly limited in distribution by its need for water at the roots. For the greater part of the year the ground between the scattered trees is naturally either devoid of vegetation, or is represented only by a few desert plants. But after the periodic flooding by the rivers, an abundant growth of vegetation springs up. The plants may be annuals, the seeds of which ripen as the ground dries, and lie dormant till moisture comes again; or they may be bulbous and tuberous forms, having but a short period of vegetative activity, but possessing underground stems capable of withstanding prolonged drought. The result is that man did not require to clear land for crops; Nature periodically cleared it for him. He had but to make the fairly obvious deduction that water alone was necessary for the apparently barren soil to blossom like the rose; from all the choice of plants which the flooded ground offered, he had to pick out those of some use to him, and learn to suppress the rest. As has often been pointed out, he had no need to trouble greatly about renewing the fertility of his lands, for the flood-water did this for him.

So soon as he had learnt the initial lessons of cultivation, he was tied to the area normally flooded at certain seasons, or to which he could lead the flood-water. He intercalated his crops along one of Nature's lines of weakness, in a transitional area which passed periodically from one climatic zone to another, being, according to the seasons, either a desert or fertile.

The bordering desert ensured isolation, and, continuing the island metaphor, we may say that it represented the sea. Its effect was to throw the whole energy of the community towards the centre, for the periphery formed an area in which the characteristic mode of life could not be practised. Similarly, it gave protection, for it is unsuited to any save a highly

specialised culture, which must have been of relatively late origin. So far as it formed the boundaries of the incipient state, therefore, the desert constituted a barrier preventing the ingress of potential foes. In neither case, of course, was the desert rim complete, and the conditions upstream varied in the two areas, and were, as has often been pointed out, from the point of view of safety, on the whole less favourable in the case of Babylonia than in that of Egypt.

As to the third point, it is, I think, easy to show that while the isolation of the areas was markedly conducive to the rise of civilisation and to its growth up to a certain point, in the long run it became a danger. First, the contrast between the belt which could be watered and that to which, with the means available, water could not be carried, was exceedingly sharp. There was little possibility of a gradual spread into areas becoming slowly but progressively different, where new aptitudes could be acquired, new experience gained, and new forms of wealth stored. Specialisation was high within the favoured tract, but the limits set by Nature could not be passed.

Again, as has often been noted, the conditions led necessarily to a centralised and imperialistic form of social organisation. If there was a sharp line of demarcation between the areas which could and could not be watered, there were great possibilities in the direction of extending by artificial means the belt over which the flood-water spread. This involved the gradual growth of an elaborate irrigation system, and for the maintenance of this a centralised power was essential. This brought with it, as a correlated advantage, the possibility of organised defence when developing neighbouring communities attempted to encroach. But if the attack was made with sufficiently powerful forces, the centralisation became a menace. An attacking foe able to destroy or damage seriously the irrigation system could cut off at its source the basis of prosperity, and render reconstruction on the old scale almost impossible. In other words, the community became adapted to artificial conditions created by itself; if and when those conditions were destroyed, the survival of the old culture became impossible.

Turn next to the Mediterranean region, that is, to the area in which the typical Mediterranean climate prevails. In so far as the native plants are concerned, this area shows certain broad general resemblances to the river-valleys, with some striking differences. Thus the characteristic plant formation is alternately open and closed; closed during the cooler season of the year when the winter rains cause a brief but intense growth of annuals and bulbous or tuberous plants, open during the drought of summer when the trees and shrubs stand apart from each other with bare earth between. But the contrast is due, as indicated, to the rainfall conditions, not to flooding. There is thus no natural renewal of fertility, and plants which require much water can only thrive in the cooler season, so that growth is less intense than in either the Nile or the Euphrates-Tigris valley.

On the other hand, because of the climatic conditions, trees and shrubs, alike as regards individuals and species, are far more numerous represented in the Mediterranean region. Here, however, we come to a

very curious fact, which, though it is familiar enough does not seem to have been considered in all its bearings. This is that, despite the (relative) wealth of native species of shrubs and trees, those which are cultivated seem to have been for the most part introduced. This is apparently true even of the supremely important olive. The tree occurs in the fossil state, and the olivaster of the maquis is believed by many to be truly wild, not feral. Yet it would appear almost certain that the *cultivated* olive was introduced, into Europe at least. The same thing is true of great numbers of other species, and of all the fruit-bearing trees now grown in the area there are few indeed which can be reasonably regarded as having originated there as cultivated forms. Now, the deduction that I would draw is that the Mediterranean area is one in which lessons first learnt elsewhere could be easily practised, but one rendered unsuited by the natural conditions for the taking of the first steps.

Man was doubtless first attracted to the area, as in the case of the river-valleys, by the natural resources, small though these must have been, even with the addition of the sea fisheries. He became fixed to it when he learnt that the hill spurs gave safe sites for settlements, while affording easy access to the slopes on which he could carry on his special form of intensive cultivation. That form, as already suggested, was a derived and not an original one. He replaced the native trees and shrubs by useful cultivated varieties or species, which had, certainly for the most part, originated elsewhere. He intercalated short-lived annuals like corn crops and beans along the line of weakness indicated by the periodic opening and closing of the natural vegetation. But one of his great difficulties was always that the absence of much level land and the climatic conditions rendered the growth of such crops relatively difficult, much more difficult than in the river-valleys.

If we think of the early settlements as showing a general resemblance to the Berber villages of the Algerian Atlas to-day, we realise that they were more or less isolated from one another, so that the social polity was of a wholly different type from that existing either in Babylonia or in early Egypt. But, and this seems to me important, although the natural conditions—especially the fact that fertility was limited to certain areas—made a measure of isolation inevitable, yet the sea gave a possibility of free movement in all directions—which was absent in the river-valleys. Thus oversea, if not overland, spreading could take place, and the changes in the geographical conditions as the sea is traversed westward are relatively small, not outside the limits of adaptation. Thus we have the spread of the higher forms of Mediterranean culture from the eastern end of the sea towards the west, with the founding of new settlements of generally similar type to the old. This possibility of free movement brought with it a wider range of adaptability, a constant willingness to profit by new experiences, which has proved of enormous value to the world at large.

But with all its advantages the Mediterranean area, as already stated, had the great disadvantage that bread-stuffs were difficult to produce in quantity. Two methods of getting over that difficulty could be and were practised. For example, the ancient Greeks,

having, it would appear, learnt the lesson from the Phœnicians, dared, in course of time, to descend from their hill-spurs to the sea-coast, in order to supplement the scanty resources of their limited lands by sea-trading. After a long interval the medieval cities, especially of Italy, did the same thing on a greater scale and with the advantage of a wider market. Between the two periods Rome tried the other possible method, that of holding in subjection the areas, outside that of the characteristic climate, which were corn-producing. Her failure was, at least in part, due to geographical causes. The great advantage of the method of sea-trading was the increase in the power of adaptation which it brought, as a result of the continual peaceful contact with other lands and other peoples. The decay of the splendid medieval cities of Italy came when the Mediterranean ceased to be a great highway of commerce, and the vivifying breezes from the outside world which had swept through it took another course—once again, therefore, a civilisation based upon a delicate adjustment to a particular set of conditions fell when those conditions changed.

Let us turn next to the third great area where, comparatively late, a complex civilisation grew up, that of the forest belt of Central and Western Europe. Here the conditions appear relatively so unfavourable that man could scarcely have solved the problem of fixing himself permanently to particular areas, and adapting himself to them, were it not for the help of the experience gained elsewhere. The great agent in transmitting that experience was, of course, first the Roman Empire, and then the Church which was the direct heir of the empire.

The essential difficulty here was that the characteristic plant formation was the closed temperate forest. At first sight there appears to be within it no line of weakness along which cultivated plants can be intercalated, and the establishment of cultivation seems to depend upon the complete destruction of the natural vegetation, involving the slow and peculiarly laborious clearing of the forest. Had the temperate forest been in point of fact as continuous as we are apt to assume, the problem would have been so difficult that the hunter's life in the forest might have lasted much longer than it did. We know, of course, that there were always "islands" in the sea of green, and of these the most important, from the point of view of the development of cultivation, were the loess areas and the lower uplands, especially those over chalk. We have, therefore, as our starting-point in this case scattered settlements in the woods—not compact ones like those of the Mediterranean region. As to the next stage, the surrounding wood must be regarded from two points of view. Initially it formed a protection, the protective influence being strongest where the ground was ill-drained, owing to the dense thickets which covered the marshy ground. But, in contrast to both the types of region already considered, given the necessary tools for the clearing of the land, the particular type of cultivation could be extended almost indefinitely on the level, while leaving the woods on the rising ground to supply the necessary fuel, building material, and pannage for the swine. This was a great advantage, but it meant that the necessary protection was soon lost.

In North-Western Europe that protective influence was peculiarly necessary for one geographical reason, as it was on the eastern margin of the continent for another. It was necessary in the west especially, because the sea-coasts, owing to the local wealth of fish, early attracted population. But in many regions those coasts, exposed to the oceanic type of climate in its most pronounced form, were unsuited to cultivation. At the same time, on account of their sheltered inlets, parts of those coasts were well fitted to breed a seafaring folk. Unable, or able only to a very small degree, to supplement their natural resources by cultivation, having at the same time command of the sea, those seafarers tended constantly to raid the painfully cleared and cultivated lands of their more fortunately situated neighbours, who, time and again, found their encircling woods a protection. We must suppose, therefore, that the tendency to clear more and more land would be checked by this need for the shelter of the woods.

But it seems to me that we may regard the growth of feudalism, from one point of view, as an adaptive device by which the growing agricultural settlements obtained, at a price, the necessary protection. Feudalism, in the form, for example, in which it grew up in England before the coming of the Normans, was a means of ensuring the existence of a kind of organisation which permitted clearing of forest land to go on indefinitely, while diminishing the risk of perpetual raiding.

It was also, more especially in Eastern Europe, something more, for it tended to fix the cultivator to the land. The tendency to wander may be said to be almost universal in the case of forest-dwellers carrying on primitive agriculture. Its wide distribution is due to the great difficulty of maintaining there the fertility of the land, more especially when exhausting crops, like the different kinds of grain and flax, are grown.

Feudalism helped in the solution of this problem by checking the natural tendency of the cultivator to abandon exhausted lands and move on to new ones. But even apart from this particular device, the problem of maintaining fertility had to be tackled early in the West, because the relief made the forest far less continuous and uniform than in the East. It must have been obvious quite early that it was not illimitable. Conditions were different in the forest region of the East, where the vast, almost uniform plains, the absence of well-marked relief, and the breadth of the continent made the forest a more permanent and unmanageable element than in Western Europe. Here, therefore, we find in suggestive combination two peculiar features. The first is that the wandering instinct, the instinct that brought the Slavs from their eastward forest home far into Central and Southern Europe, still persists. It is said to be quite well marked in parts of Russia, despite all the artificial checks which existed under the old regime. Part of the difficulty of the Slav problem also lies in the fact that the effect of the habit of small groups of wandering constantly from one wooded tract to another is written large on the ethnological map.

The second peculiar feature is that feudalism, and feudalism in a very harsh form, survived here far

longer than in Western Europe, and in fact, if not in law, had scarcely disappeared when the war broke out. I would suggest that the great significance of this form of social policy here was that it helped to counteract the effects of the natural conditions, that it was fundamentally an artificial device for rendering the population stationary, and enabling it to adapt itself to the local relief and associated phenomena.

Now, whatever its value in earlier days, the present chaos in Eastern Europe shows clearly enough that ultimately it checked social evolution, and became a serious menace. It was fundamentally the erection of an artificial barrier round the rural community, and led to the apparent loss of the power of slow adaptation to changing conditions, alike on the part of the overlords and of the freed serfs.

But in the eastern chaos another factor has to be borne in mind. In the Old Russia, south of the forested area, and extending both into what is and was Rumania, lie the great treeless plains. Parts of these, as the nineteenth century showed, are extraordinarily fertile and well adapted for cereal production. But, from the point of view adopted here, they suffered from the enormous disadvantage that there is nothing in the natural conditions to fix their inhabitants to special areas, thus enabling them to acquire qualities fitting them for life there; nothing to give protection from constant inroads from Asia. Literally wastes for long centuries, these plains were for the most part ultimately incorporated in Imperial Russia, and deliberately colonised, often with colonists from a distance. The colonists were brought from areas of other characters, possessed traditions and aptitudes due to long experience of different geographical conditions, and were in the grip of a Government which had itself evolved under those conditions. There was thus no question of the possibility of the evolution of a type of culture bearing the imprint of the local conditions.

In consequence Russia to-day—as well as to some extent Rumania—is faced with a double problem. In both regions parts of the constituent lands are fitted for the mixed cultivation of the forest belt, and in them the old social policy has shown itself unfitted for modern conditions, and a new one has yet to be evolved. Other parts, again, have never developed even an imperfect social policy which was a response to their own local environment. Their apparent prosperity, till the outbreak of the war, was due to the fact that they were, economically though not politically, of the nature of colonies in relation to the industrialised West; they were, fundamentally speaking, the equivalents of Imperial Rome's corn-producing lands in North Africa and the Danubian plains. The chaos in Eastern Europe is thus having a reflex disturbing effect upon the West. The West has lost an important market, but that is perhaps in itself less important than the fact that over a large tract of European land man and his environment have been thrown out of gear, a catastrophic condition which inevitably disturbs equilibrium elsewhere. Just as in the later days of the Roman Empire disturbances in the marginal corn-producing lands shook and ultimately overthrew the centre, so are the centres of Western European civilisation to-day trembling under the impact of shocks

emanating from the East. We can well understand, therefore, how it is that there are those who believe that the focus of civilisation is destined to undergo another shift, and that the day of the predominance of North-Western Europe is drawing to a close.

The subject is not one which can be discussed here. But if I may sum up briefly the points I have been trying to make, I would say that the human geographer should have before him a twofold purpose. First, he should strive to show that the deductions which the biologists have slowly and painfully laid down in the course of the last sixty years apply, though with an essential difference—which requires careful definition

—to the life of man. Secondly, he should use his precise knowledge of the surface of the earth to work out detailed applications of those deductions. In other words, human geography is the biology of man, and, on account of man's vast power of modifying his environment, necessitates a fuller knowledge of that environment than can be required of the biologist in the narrower sense. Investigations along these lines would, I think, promote greatly the interests of geography as a whole, both by making clear to the general public its value and in justifying that intensive study of the surface relief and the associated phenomena which must always remain its basis.

Educational and School Science.¹

By Sir RICHARD GREGORY.

THE Educational Science Section of the British Association, which attains its majority this year, was established to consolidate the claims staked out by workers in different educational provinces, and promote common interest in their development as a whole. As Prof. H. E. Armstrong explained at the opening meeting, it was proposed to devote attention to education in all its branches with the object of introducing scientific conceptions into every sphere of educational activity; that is, conceptions which imply such exact and profitable treatment of a subject as should come from full knowledge. Educational science signifies, however, much more than methods of teaching or the theory of the curriculum. It involves conditions of physical, mental, and moral health, with their manifold types and variations, and the determination of the most appropriate, and therefore most effective, factors of growth at every stage of development. In its present stage educational science must be largely empirical, but in this respect it does not differ from meteorology, for example; and the laws which govern the perpetually varying contents and conditions of a child's mind are not much less precisely known or applied than those by which atmospheric changes are determined.

Education may, therefore, be defined as the deliberate adjustment of a growing human being to its environment; and the scope and character of the subjects of instruction should be determined by this biological principle. What is best for one race or epoch need not be most appropriate for another, but always the aim should be to give the pupil as many points of contact with the world around him as may be profitably developed during his school career. This does not mean, of course, that his vision is to be confined to contemporary necessities or his thoughts to provincial or even national fields. The resources available for his instruction and guidance comprise the wisdom and experience of the past as well as the power of the present, and in their extensive and varied character they now provide teachers with educational opportunities richer and fuller than those of any other period of the world's history. Literature and art form noble domains of the heritage into which the child of to-day is born, but they were mostly planted long ago, and

their shapes have not been altered much in modern times. Science has, however, transformed the whole landscape entrusted to it, and the realm of its productivity is continually extending. It is a kingdom potent with possibilities for good or evil—an inheritance which cannot be renounced—and to let any of our children grow up unfamiliar with their entailed possession is to neglect an obvious duty.

The essential mission of school science is thus to prepare pupils for civilised citizenship by revealing to them something of the beauty and the power of the world in which they live, as well as introducing them to the methods by which the boundaries of natural knowledge have been extended and Nature herself is being made subservient to her insurgent son. We live in a different world to-day from that of medieval times, when the *trivium* of grammar, logic, and rhetoric, with the *quadrivium* of arithmetic, geometry, music and astronomy, comprised the subjects of a complete education in the sciences as well as in letters—different indeed from what it was only a century ago. The influence of science is now all-pervading, and is manifest in all aspects of human activity, intellectual and material. Acquaintance with scientific ideas and methods and applications is forced upon every one by existing circumstances of civilised life with its facilities for rapid transport by air, land, or sea, ready communication by telephone or telegraph, and other means by which space and time have been brought under control and man has assumed the mastership of his physical and social destiny. Science permeates the atmosphere in which we live, and those who cannot breathe it are not in biological adjustment with their environment—are not adapted to survive in the modern struggle for existence.

School instruction in science is not, therefore, intended to prepare for vocations, but to equip pupils for life as it is and as it soon may be. It is as essential for intelligent general reading as it is for everyday practical needs; no education can be complete or liberal without some knowledge of its aims, methods, and results, and no pupil in primary or secondary schools should be deprived of the stimulating lessons it affords. In such schools, however, the science to be taught should be science for all, and not for embryonic engineers, chemists, or even biologists; it should be science as part of a general education—unspecialised,

¹ From the presidential address delivered to Section L (Educational Science) of the British Association at Hull on Sept. 7.